Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service	)	IB Docket No. 17-95

To: The Commission

COMMENTS OF
THE BOEING COMPANY

The Boeing Company ("Boeing") has long believed that the Commission should permit the use of earth stations in motion ("ESIMs") in every frequency band that is allocated for use by the fixed-satellite service ("FSS"), including with satellites in geostationary ("GSO") and non-geostationary satellite orbit ("NGSO"). Further, ESIMs should be permitted to communicate with FSS satellites pursuant to the same regulatory status as the underlying FSS network. Such action is appropriate because ESIMs operate using electronic and mechanical tracking, steering, and beam shaping techniques to ensure that their emissions do not exceed the interference limits applicable to FSS earth stations at fixed locations. In addition, ESIMs can receive downlink transmissions from FSS satellites without resulting in any impact on the interference environment.

With this background, Boeing supports the adoption of each of the proposals identified by the Commission in its Further Notice of Proposed Rulemaking ("*FNPRM*")[1] addressing the use

[1] Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service, IB Docket No. 17-95, *Further Notice of Proposed Rulemaking*, FCC 18-138 (Sept. 27, 2018) ("*FNPRM*").

of ESIMs with GSO networks. Boeing also urges the Commission to continue the process of updating the regulations for FSS by adopting further rulemaking notices addressing the use of ESIMs in the remaining frequency bands allocated for FSS, including the 10.7-11.7 GHz band,[2] 12.2-12.7 GHz band,[3] additional portions of the 27.5-30 GHz band,[4] and throughout the V-band.[5]

Nearly two decades of experience have demonstrated that ESIMs provide important public interest benefits by enabling the transmission of high data rate broadband communications services to end users in large mobile platforms such as aircraft, busses and ships. These important markets were previously unserved (or severely underserved) by terrestrial broadband distribution technologies. Using ESIMs, passengers are increasingly able to make more productive or entertaining use of their time in transit. The Commission should continue to facilitate this trend by authorizing the use of ESIMs in each of the frequency bands identified in its *FNPRM* and in every other frequency band allocated for use by FSS networks.

I. THE COMMISSION SHOULD AUTHORIZE ESIMS TO RECEIVE SIGNALS FROM GSO FSS NETWORKS IN THE 10.7-10.95 GHZ AND 11.2-11.45 GHZ BANDS ON AN UNPROTECTED BASIS

The Commission should authorize the use of ESIMs through blanket authorizations in the 10.7-10.95 GHz and 11.2-11.45 GHz portions of the Ku-band. Although these frequencies are governed by Appendix 30B of the International Telecommunication Union ("ITU") Radio Regulations, the Commission has authorized FSS networks to operate ESIMs in these frequencies,

---

[2] *See Comments of Kepler Communications Inc.*, IB Docket No. 18-315 at 2 (Feb. 11, 2019).

[3] *See Comments of Worldvu Satellites Limited*, IB Docket No. 18-315 at 1-7 (Feb. 11, 2019).

[4] *See Comments of Viasat, Inc.*, IB Docket No. 18-315 at 7-8 (Feb. 11, 2019).

[5] *See Comments of SES Americom, Inc. and O3B Limited*, IB Docket No. 18-315 at 9 (Feb. 11, 2019); *Comments of The Boeing Company*, IB Docket No. 18-315 at 11-12 (Feb. 11, 2019).

including to communicate with earth stations on aircraft and vessels.[6] Importantly, both of these frequency bands are used solely for space-to-earth communications. Therefore the passive operation of ESIMs in this spectrum cannot result in harmful interference to other satellite or terrestrial services operating in these frequency bands.

Among other benefits, the use of these frequencies by ESIMs will help to align the FSS frequencies that are available for use by ESIMs in different regions of the world. This alignment is important because many ESIMs—including those on airplanes and ships—do not limit their operations to single continents.

Boeing recognizes that, because these frequency bands are governed by Appendix 30B, they are not covered by the Commissions' two degree spacing rule.[7] As a result, the Commission authorizes FSS earth stations to receive signals in the 10.7-10.95 GHz and 11.2-11.45 GHz bands only pursuant to its non-routine licensing procedures identified in Section 25.220 of its rules.[8] This means that earth station license applicants must secure authority to communicate with each satellite operating in these frequencies on an individual basis. This treatment, however, has not precluded the Commission from granting authorizations for networks of fixed earth stations to receive signals in these frequencies on a blanket license basis. The Commission should therefore also authorize ESIMs to receive signals in these frequencies using a blanket license approach.[9]

---

[6] *See, e.g.,* Panasonic Avionics Corp., Call Sign E100089 (ESAA license authorizing use of 10.7-12.75 GHz); Blue Marble Network, LLC, Call Sign E100102 (ESV license authorizing use of 11.2-11.7 GHz frequencies).

[7] *See* Comprehensive Review of Licensing and Operating Rules for Satellite Services, FCC 15, 167, *Second Report and Order*, 30 FCC Rcd 14713, ¶ 205 (2015).

[8] *See* 47 C.F.R. § 25.220.

[9] *See* 47 CFR § 25.225(f)(2).

II. THE COMMISSION SHOULD AUTHORIZE ESIMS TO RECEIVE SIGNALS FROM GSO FSS NETWORKS IN THE 17.8-18.3 GHZ BAND ON A SECONDARY BASIS

The Commission should permit ESIMs to receive signals from GSO FSS networks on a secondary basis in the 17.8-18.3 GHz downlink band, just as the Commission subsequently proposed to do with respect to NGSO FSS systems operating in the same frequencies.[10] The existence of ESIMs in these frequencies will not interfere with fixed service ("FS") networks because they will continue to be protected by the power flux density ("pdf") limits on satellite downlink communications that are maintained by the ITU to protect primary terrestrial uses of the 17.7-18.3 GHz frequencies. Further, despite the primary use of the band by FS networks, ESIMs will be able to successfully receive downlink transmissions from GSO FSS satellites just as they are currently received by earth stations at fixed locations.

In fact, ESIMs will arguably be even more capable of successfully receiving downlink transmissions from GSO FSS satellites on a secondary basis as compared to earth stations at fixed locations. When an earth station at a fixed location suffers harmful interference from an FS transmitter, the only option for avoiding the interference is to shift to a different receiving frequency. ESIMs, in contrast, are able to employ this same mitigation measure and, if insufficient, can always move to a new location where the interference does not exist. Further, given the relatively high speeds in which many ESIMs will be in motion, any harmful interference received from FS transmitters will only be momentary in duration. Any lost transmissions during such momentary interruptions will automatically be re-transmitted by the network, likely resulting

[10] *See* Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations, IB Docket No. 18-315, *Notice of Proposed Rulemaking*, FCC 18-160, ¶ 13 (Nov. 16, 2018).

in no detectible interference to the ESIM end user's services. In addition, some FSS operators may maintain databases of FS link locations and automatically switch ESIMs off all or a portion of the 17.8-18.3 GHz band when they are approaching those locations. Therefore, such ESIM operations will be able to operate successfully and should be authorized on a secondary basis.

The authorization of ESIMs to receive signals from GSO networks in the 17.8-18.3 GHz band will also help to align the frequencies available to ESIMs in the United States with those that are available in the rest of the world. As the Commission is aware, the 17.8-18.3 GHz band is allocated to FSS worldwide on a co-primary basis with other services.[11] Therefore, the Commission's decision to authorize the use of the 17.8-18.3 GHz band for ESIMs on a secondary basis in the United States will help to harmonize operations for ESIMs transiting internationally.

III. THE COMMISSION SHOULD AUTHORIZE ESIMS TO RECEIVE SIGNALS FROM GSO FSS NETWORKS IN THE 19.3-19.4 AND 19.6-19.7 GHZ BANDS ON A PRIMARY BASIS

ESIMs should also be permitted to operate with GSO FSS systems on a primary basis in the 19.3-19.4 GHz and 19.6-19.7 GHz (space-to-Earth) frequency bands. FSS networks were recently authorized by the Commission to operate on a co-primary basis in these frequencies using pdf limits to protect co-primary FS operations.[12] ESIMs can successfully receive signals from GSO FSS satellites that are compliant with the pdf limits in the 19.3-19.4 GHz and 19.6-19.7 GHz bands. Therefore downlink transmissions of GSO FSS satellites will protect FS systems regardless of whether the satellite signals are received by ESIMs or earth stations at fixed locations.

---

[11] 47 CFR § 2.106.

[12] *See* Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Report and Order and Further Notice of Proposed Rulemaking*, 32 FCC Rcd 7809, 7814-15, ¶ 19 (2017) ("*NGSO FSS Order*").

In addition, no concern should exist about adjacent channel interference from GSO FSS systems into feeder links for mobile-satellite service ("MSS") networks operating in the intervening 19.4-19.6 GHz band. GSO and NGSO FSS systems are already permitted to operate below 19.4 GHz and above 19.6 GHz, so the reception of these transmissions by ESIMs will not alter the spectrum sharing conditions. In fact, given the long history of success in operating ESIMs on a shared and coordinated basis with other services, consideration should be given to opening the 19.4-19.6 GHz band to both GSO and NGSO FSS systems, including those operating with ESIMs, on a secondary basis with respect to MSS FSS feeder links in these frequencies.

IV. THE COMMISSION SHOULD AUTHORIZE ESIMS TO COMMUNICATE WITH GSO FSS NETWORKS IN THE 18.8-19.3 GHZ DOWNLINK AND THE 28.6-29.1 GHZ UPLINK BANDS ON AN UNPROTECTED, NON-INTERFERENCE BASIS WITH RESPECT TO NGSO FSS SYSTEMS

The paired 18.8-19.3 GHz and 28.6-29.1 GHz bands are some of the only frequencies allocated to FSS in which NGSO FSS systems are not required under the Commission's rules to protect GSO FSS networks. Until recently, the FSS allocation for the 18.8-19.3 GHz downlink band was available solely for NGSO FSS systems in the United States.[13] The Commission, however, recently authorized GSO FSS networks to operate in this band on an unprotected, non-interference basis with respect to NGSO FSS systems.[14] Consistent with this, the paired 28.6-29.1 GHz uplink band is also allocated on a primary basis for NGSO FSS systems in the United States, with GSO FSS networks permitted solely on a secondary basis.[15]

---

[13] 47 CFR § 2.106, n.NG165.

[14] *See NGSO FSS Order,* ¶ 14.

[15] 47 CFR § 25.202(a)(1), n.3. Internationally, NGSO FSS systems have equal, primary status in these bands, *see* ITU Radio Regulations, No. 5.523A, meaning that sharing between non-U.S. licensed NGSO and GSO FSS systems is governed by the international coordination process.

With this important background in mind, Boeing supports allowing ESIMs to communicate with GSO FSS satellites in these paired spectrum bands on an unprotected, non-interference basis. The Commission, however, must be diligent in ensuring that the subordinate status of GSO FSS networks remains this way as compared to NGSO FSS operations. As the Commission is aware, Echostar has recently tried repeatedly to elevate the regulatory status of GSO FSS networks in these frequencies. First, Echostar argued that the Commission should adopt a "default mechanism" in the event operators of NGSO and GSO FSS systems do not reach an agreement on the level of protection GSO FSS networks must provide to NGSO FSS systems in this spectrum.[16] Second, Echostar argued that ESIMs operating with NGSO FSS systems should be treated as "co-equal" with GSO FSS networks in this spectrum,[17] which would have the practical effect of making ESIMs operating with NGSO FSS systems secondary to preexisting GSO FSS networks.[18]

Instead, the Commission should continue to adhere to its recent statement that "[w]e believe that preserving the 18.8-19.3 GHz and 28.6-29.1 GHz bands for more intensive use by burgeoning NGSO FSS systems will serve the public interest."[19] Boeing believes that more intensive use of these frequencies by NGSO FSS systems can be promoted while concurrently allowing ESIMs to operate with GSO FSS networks in the 18.8-19.3 GHz and 28.6-29.1 GHz

---

[16] *See* Letter from Brennan Price, Senior Principal Engineer, Regulatory Affairs, EchoStar Corporation, to Marlene H. Dortch, Secretary, FCC, at 2-3 (Sept. 19, 2017); Letter from Jennifer A. Manner, Senior Vice President, Regulatory Affairs, EchoStar Corporation, to Marlene H. Dortch, Secretary, FCC at 2 (Sept. 1, 2017).

[17] *See Comments of Echostar Satellite Operating Corporation and Hughes Network Systems, LLC,* IB Docket No. 18-315, at 4 (Feb. 11, 2019).

[18] *See Rely Comments of The Boeing Company*, IB Docket No. 18-315, at 2-4 (March 13, 2019) (explaining why Echostar's latest proposal would make ESIMs operating with NGSO FSS systems effectively secondary in these frequencies).

[19] *NGSO FSS Order*, ¶ 14.

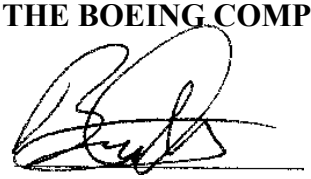
bands, but only if the Commission does not waiver in ensuring that NGSO FSS systems continue to have priority over GSO FSS networks in these frequencies.

V. CONCLUSION

Boeing supports each of the measures proposed in the Commission's *FNPRM* addressing the operation of ESIMs with GSO FSS networks. Boeing additionally urges the Commission to continue to expand the public interest benefits resulting from the provision of broadband satellite services using ESIMs by authorizing the use of ESIMs with both GSO and NGSO FSS systems in every frequency band that is available for use by FSS networks, in each case employing the same regulatory status and interference limits that are applicable to the underlying FSS satellites and earth stations. Such action is appropriate given the substantial public interest benefits that are being made available to end users using ESIMs and the absence of interference concerns resulting from the deployment of ESIM terminals in shared spectrum bands.

Respectfully submitted,

THE BOEING COMPANY

By: 

Audrey L. Allison
Vice President, Global Spectrum Management
The Boeing Company
929 Long Bridge Drive
Arlington, VA 22202
(703) 465-3215

Bruce A. Olcott
Jones Day
51 Louisiana Ave. NW
Washington, D.C. 20001
(202) 879-3630

Its Attorneys

April 8, 2019